# THE EFFECT OF TWO DIFFERENT WPM LISTENING RATES ON LEARNING AND RETENTION OF BLIND SCHOOL CHILDREN

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# THE EFFECT OF TWO DIFFERENT WPM LISTENING RATES ON LEARNING AND RETENTION OF BLIND SCHOOL CHILDREN

BY

**MITAT AHMET ENÇ**

B.S., Teachers College Columbia University, 1938
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## THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN EDUCATION
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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY

SUPERVISION BY Mitat Ahmet Enç

ENTITLED The Effect of Two Different wpm Listening Rates on Learning and Retention of Blind School Children

BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

THE DEGREE OF Doctor of Philosophy

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## Chapter I

# THE PROBLEM AND THE REVIEW OF LITERATURE

### The Purpose of the Study

Learning through listening to spoken messages is one of the most common conditions under which we acquire information. This frequently employed channel of communication is more important for children than adults, yet Rankin (25) found, "adults talk three times as much as they write, and in ordinary adult activities use verbal listening three times more than reading." Lazarsfeld (16) also indicated that, of the adults he studied, 60 per cent obtained news through listening to radio and only 35 per cent preferred to read newspapers. This preference for listening over other channels applies even more widely to groups of individuals who are deprived of vision. Not only in their everyday social contacts, but also in their formal education, listening is the process through which the blind obtain most of what they learn. In fact, Lowenfeld (19) has reported that, "about 75 per cent of the blind in U.S either can not read braille at all or read it too slowly for effective use." This observation is supported in a booklet titled A Friend of the Blind Talking Book where it is reported that, "Of 314,000 blind people in U.S less than 15 per cent read braille well enough to make reading a pleasure" (1, p. 2).

The research findings ( 19 ) indicate that the talking book is a superior media for receiving information than is braille as far as the speed of messages is concerned. In connection with comprehension of materials, there is no evidence to indicate that for certain types of materials, listening to a talking book is less effective than braille reading. Hays ( 12 ) ascribes the larger portion of the responsibility of the three to four years of educational retardation

prevalent in the schools for the blind, to the slowness of braille reading and writing.

In spite of these facts, and since the introduction of talking books following a suggestion of Thomas Edison ( 7 ), available literature on talking books and related services are confined to the needs of adult readers. As a matter of fact, some educators of the blind do not encourage the use of talking books with school children and suggest that its use should be restricted to the reading of supplementary literature outside of the classroom. The reason for this attitude appears to be that the teachers of the blind consider talking books, more or less, as a harmful competitor of braille reading which might encourage blind pupils to neglect their braille reading.

Although this early attitude appears to be modified somewhat during the post-war years, there is a lack of studies to determine and employ the educationsl potentialities of the talking book.

The purpose of this study is to determine the effects of two different wpm rates (fast-slow) on learning and retention of blind subjects who listen to relatively long narrative type of materials.

The practical implications of such a study on the recording of talking book materials and classroom procedure may be important. Because, if the results indicate that a faster wpm rate of delivery (compared to the prevailing rates of recording talking book material) does not effect learning and retention of blind subjects unfavorably the processes of education in the schools for the blind may be speeded up effectively.

As indicated by the booklet A Friend of the Blind ( 1 ), 40,000 blind individuals, of all ages, today use the "talking book" for most of their "reading." Also, if the present initial trend of using

talking book in connection with school work continues to develop to a large scale, any saving which may result from increasing the speed of recording, in readers' time, number of discs, storage, and circulation costs will be significant.

## Review of the Literature

Although the significance of learning through listening in the education of the blind is self-evident, the problem has hardly been scratched by research. There are only two studies ( 14,19 ) with some direct and some indirect bearing upon the questions which will be referred to, in some detail, later in this section.

Several studies have been conducted with seeing subjects which investigated different variables concerned with listening and related problems. These may be classified as: (a) studies related to readibility, (b) studies related to comparison of reading and listening comprehension, (c) studies related to the effect of variations in speed of delivery, (d) studies related to listening comprehension, and (e) studies related to reading and listening comprehension of blind subjects.

### Readibility and Listenability

Although no investigation has been exclusively devoted to the study of readibility measures and its application to listenability, several authors of studies have given some attention to this question. Their comments will be summarized later, in greater detail, according to the major variables studied. However, it may be useful to indicate briefly here some observations concerning the applications of readibility measures to material presented orally. In this connection it should be noted that almost all of the studies of listening comprehension have made use of readibility formulas to establish the

difficulty level of the material used. For example, Goldstein (10 ) indicates in his conclusions that, "Passages equivalent for reading may not be equivalent for listening." Miller ( 20 ) used the Flesch and Dale-Chall readibility formula in establishing his "three style difficulty levels." However, he did not find a significant relation between these difficulty levels and listening comprehension. On the other hand, Nelson (22 ) found a relationship. Finally, Harwood (11 ) in his studies "Listenability and rate of presentation" appears to have paid special attention to the issue. He reported that:

> It was decided to design a series of experiments to find out what would happen when listenability of language samples was predicted by means of readibility formulas. ... Two types of formulas were tested. ... Predicted readibility was compared with obtained listenability and effects of different speaking rates were measured at different levels of language difficulty.

As a result of his findings, Harwood ( 11 ) concluded that rank order listenability, as predicted by Flesch's readibility and human interest formulas, at each of his seven rates was highly consistent with the predicted rank order of readibility of the stories. All his rank order correlations were significantly higher than zero. He used 487 tenth graders. As a result of this he concludes:

> Within the limits and under the conditions studied here readibility may be used as a gross predictor of listenability if the accuracy of the order of not more than plus or minus of one rank of listenability within a total range of seven ranks is desirable.

However, he also indicates that, "Though the readibility formulas predict listenability adequately for certain levels of difficulty, for other levels of difficulty listenability formulas are needed and construction of such appears to be feasible."

In summary, there appears to be rather widespread implicit acceptance of the notion that there is a positive relationship between readibility indices and listenability. There also is acceptance of

the notion that readibility yardsticks are at best a crude index of listenability and that they have limitations that could have important implications for the prediction of comprehension or learning scores from different material.

## Studies Related to the Comparison of Reading vs. Listening Comprehension

Examination of the studies comparing comprehension after reading with that of "after listening" are primarily concerned with the determination of differences and similarities in reading and listening comprehension, and particularly the differential effects of difficulty levels of the material, rates and aptitude upon comprehension, and learning through the two modes of communication.

Anderson and Fairbanks'( 2 ) study is one of the early investigations on this topic. They tested 200 college freshmen to compare the recognition of words presented visually with that presented aurally. Their findings indicate differences in the mean vocabulary read and the mean vocabulary heard. Average and good readers preferred reading, whereas poor readers preferred listening. Coarey ( 5 ) studied and compared learning achieved through listening to lectures, and learning obtained through reading. For his study he developed a test on outlining consisting of 2500 words. Out of 165 college freshmen, 82 heard the text at 100 wpm rate and 83 read the material. From this study he draws the following conclusions:

1. Immediate recall of the lecture material is better after listening than after reading.

2. After two weeks the difference between recall scores was insignificant.

Russell (26 ) tested a group of 1080 pupils, on a composition consisting of 1000 words, from fifth, seventh, and ninth grades. He

allowed those who listened to hear the passage twice and those who read were given an equal amount of time. As a result of pairing, his group was reduced to 216. From these students he found that auditory presentation was superior for the fifth graders; that reading and listening were equally effective for seventh graders; and that with the ninth graders reading was slightly superior to listening, but the difference was not significant. Carver (4) presented 91 adult subjects, some of whom were college students, with various types of meaningful material. One group read printed booklets and the other listened to the same material presented over a loud speaker. After one exposure the groups were tested. The group mainly composed of adults who were not college students comprehended the material slightly better when it was presented aurally than when presented visually, provided the passages were not too difficult or unfamiliar. Those who listened did better on "easy" material, whereas those who read did better on the "difficult" material.

Larsen and Feder ( 15 ) found support for the findings listed above. They gave the paragraph sections of Forms A and B of the Nelson-Denny Reading Test to 151 randomly selected college freshmen. Each of the forms contains nine sections, approximately 200 words in length, dealing with factual material. Paragraphs were arranged in three levels of difficulty, each level contained three passages. Passages of Form B were read over by one of the groups; they then answered four multiple choice questions. Passages of Form A were recorded on phonograph discs. After listening to the selections once, subjects were given the same type of multiple choice test, each order of presentation was used with both groups. Listening time to the passages was always longer than the reading time.

On the material of average and above average difficulty, reading comprehension was found to be superior to listening comprehension. On the easier passages listening comprehension was slightly superior.

When the total group was divided into low and high groups on the basis of academic aptitude, the low group was found to be about equal in reading and listening comprehension whereas the high group indicated a definite superiority in reading comprehension.

Goldstein's ( 10 ) study of the reading comprehension vs. listening comprehension was a departure from the earlier works. Synchronous presentation (auditory and visual) was used for better control of the conditions, and in addition various rates of presentation were employed against the single rate used in preceding studies. His 280 male and female adults ranging in age between 16 - 18 years were a cross section of the adult population in terms of intelligence, educational achievement, and cultural background. Selected, equalized standard passages from the McCall-Crabbs Standard Test Lessons in Reading were used. They were at two distinct difficulty levels and contained a total of 314 test questions. The reading group's materials were presented by means of a moving picture and the listening group heard phonograph records. The various rates ranged between 100-322 wpm with increments of 37 wpm. His conclusions, more relevent to the present study, are as follows:

1. The relative superiority of listening comprehension over reading comprehension diminished with increasing difficulty of the material.

2. Differential favoring listening was greater for easy than for hard material and both tended to be more marked for less intelligent

groups.

3. One-fourth of the experimental group scored higher on one of the two modes of presentation and within each, more intelligent groups score relatively higher on difficult than on easy passages; the reverse holding true for the less intelligent groups.

4. Reading and listening comprehension declined with increased rates.

5. Relative differences between the two modes of presentation becomes smaller at faster rates between limits of 100-322 wpm. No optimum rate of presentation is manifest for group as a whole or for groups segregated for intelligence or reading speed.

6. Speed of reading and listening comprehension were conditioned by intelligence level of the subject. At 322 wpm the more intelligent subjects grasped more than did the less intelligent groups at 100 wpm.

7. There is some indication that the faster readers find fast rates more effective for reading than for listening comprehension.

8. Passages equivalent for reading may not be equivalent for listening.

## Studies Related to the Effect of Variations in Speed of Delivery

Speed of delivery or presentation as related to reading and listening has been the concern of many studies. Some of these are exclusively given to determine the effects of speed on comprehension. Others manipulated speed along with other variables such as style difficulty, repetition, and so on.

Most of the studies appear to be concerned either with the determination of practical limits of speeded speech and its effect on comprehension or intelligibility or with the determination of the

most suitable rate of speech for one or the other purpose.

Speed has been manipulated through one of the three available techniques: (a) Increase of rate through the effort of the reader while recording. This technique is generally considered as introducing uncontrolled variables such as variations in pitch or word and sentence intelligibility. Although these may be controlled to some extent by training the reader for various speeds before recording, it also is limited in achieving higher speeds beyond a limit. (b) Increase the rate by the chop-splice technique. Certain determined fragments of a recorded tape are chopped or cut out either at the points where intervals appear, or at regular intervals without regard to pauses. Both procedures may be combined. After this the tape is mounted and re-recorded without altering original pitch and intelligibility. (c) Time compression is the latest and so far the most effective method of obtaining speeded speech. The technique developed by Fairbanks ( 8 ) and his associates involves electronically taking out a few miliseconds of the content at regular interval and compressing the remaining together without altering voice quality, intelligibility, and phonetic units.

Opinions and findings concerning the concept of average speed of speech differ considerably among the investigators. Apparently it depends upon three basic factors: (a) the content, (b) the listener, and (c) the speaker. However, time and place also should be taken into consideration.

Darley ( 6 ) prepared three (300 word) passages containing factual information, one of the passages being in monosyllabic, the second in average length, and the third in polisyllabic words. Two hundred college students read these to an imaginary audience. He

found that the monosyllabic text had the lowest average wpm rate (115.2), and the polisyllabic text had the highest wpm rate (200.7). Mean rate in syllables per minute increased with the syllabic difficulty of the passage.

Franke ( 9 ) phonographically recorded 32 subjects' reading of factual material with approximate length of 295 words. When results were treated in terms of wpm rate, a group mean of 157.37 wpm with a range of 131.06-189.32 wpm was found.

Cantril and Allport( 3 ) attempted to determine the optimum rates of speech for various kinds of material, in its relation to radio speaking. Their findings indicate a wpm rate of 110-130 for abstruct content, 140-180 wpm for arguments, 120-140 wpm for factual talks, 90-115 for directions, 120-140 wpm for news and, 120-150 for narrative.

Henneman (13 ) attempted to study the practical limits of speeded speech through the use of chop-splice technique. He prepared 11 experimental tapes varying in the amount of unchopped tape and words removed. His preliminary findings indicate that with the increased rate the comprehension in terms of correctly answered test items decreases. Thus an increase of speed of 200 per cent reduced test correctness to 95 per cent, by 300 per cent to 80, by 400 per cent to 40 per cent.

Learning from Listening

There are a few well designed investigations which studied different variables related to listening comprehension. For example, Loder ( 18 ) studied the problem of listening to live vs. recorded speech, with 449 eighth grade pupils. He transmitted lessons on factual materials to one of the groups while another group listened to the live speaker. Subjects were given a pretest to determine their pre-knowledge of the lessons, one post-test

immediately at the conclusion of the lesson to determine comprehension and two more tests at different intervals to establish the recall scores. Although his findings indicate a slight superiority on the scores of the group who listened to the live speaker, this difference may be attributed to the fact that no attempt at matching the groups was made.

Nichols ( 23) tried to determine the variety of factors that effect individual variations in listening comprehension in a classroom situation. Using 200 college freshmen as subjects he concluded that listening comprehension depends, among other things, on the following variables: definite skills and habits of listening, intelligence, and particularly certain facades of intelligence, such as mental set, reading comprehension, recognition of correct English usage, ability to structure a speech, and size of listener's vocabulary. Most of his concepts are derived from linguistics rather than from psychology.

Speeded Speech

Nelson (22 ) chose radio newscasts to study problems of listening comprehension. He investigated the effects of rates, difficulty levels of the material, differences in newscasters, differences in the intelligence of listeners, and finally differences in interest in the related material. Current, local, national, and international news item each consisting of 1500 words were used as material. For rates, a range of 125-225 wpm, with 25 wpm increments between each step, was selected. Speakers were chosen by qualified judges on relevant characteristics. Nelson used 250 university students in groups of 50. Each group represented two distinct aptitude levels. To determine the effect of interest on recall, an Interest Inventory

was given one week prior to the experiment. The experimental period consisted of five consecutive days of listening and testing. Each student listened to five different newscasts, by five different speakers at five different rates and immediately after they were given a test of multiple choice items through which the comprehension scores were established. The two difficulty levels of the newscasts were established through the employment of Flesch's readibility formula. The findings are as follows:

1. Although the average scores for each rate (from highest to lowest) increased reversibly with the exception of 200 wpm indicating a slight rise, the F-ratio for rates was not significant (.06 level).

2. Most of the students preferred 175 wpm to the other four rates. Also 56.8 per cent of the subjects indicated loss of interest at the lowest rate (125 wpm) while 31.6 indicated loss of interest at 225 wpm, the highest rate.

3. There were small differences in average scores for each newscaster (.97 score point between highest and lowest).

4. Correlation between scores and Iowa Entrance Examination scores on the basis of which the two aptitude groups were identified, was positive but small.

5. The differences in the difficulty levels of newscasts were the only highly significant factor influencing recall.

6. Correlations between the Interest Inventory and scores of recall test was very low.

Harwood ( 11 ) recorded at four speeds (125, 150, 175 and 200 wpm) seven 300 word stories which were heard by 487 tenth grade students. No significant effect of rate was found, although there was evidence of a slight trend toward decreased comprehension with

increased rate.

Miller (20 ) in his study of "Effects on Learning of Variations in Aural Presentation" investigated the variables of rate, style difficulty, redundency, and aptitude level in their relations to learning through listening. In this experiment the three wpm rates were 95, 125, and 165. The style difficulty levels (using Flesch and Dale-Chall formulas) were eighth grade, 12th grade, and college levels. The redundency variations were no repetition, internal repetition (repetition of important parts),external repetition (repetition of total message). Six aptitude levels, based upon the Air Force Electronic Aptitude Index were used. Significant effects were found for aptitude and for style by redundency interaction.

Miller's findings concerning the effect of rate, style, difficulty, and redundency on learning is at varience with the findings of Goldstein (10 ), Nelson (22 ), Harwood (11 ) which were reported earlier. A possible reason for this difference is the inadequate equation of the groups. The conditions under which the experiment was conducted, do not permit a between group analysis. His failure to find that differences in rate which affect test scores may be due to the narrow range and relatively low wpm rates employed. Also, no difference in test scores when there is a 70 wpm rate difference could be significant if the test scores were expressed as scores per minute of listening time. Fairbanks' study in the following paragraph appears to justify this line of reasoning.

Comprehension

Fairbanks, Guttman, and Miron ( 8 ) report a series of three experiments using a mechanical device to achieve time compression. In these experiments the effect of rate, difficulty of content, and

repetition upon comprehension were investigated in relation to the following problems: (a) The effect of message rate upon the comprehension of factual material. (b) The relative effect on comprehension of a single presentation at moderate rate vs. a double presentation at twice the moderate rate (50 per cent compression), and (c) the relative effectiveness of internal vs. external redundency with speeded rate.

The material used in the experiment consisted of two relatively long messages on meteorology, recorded on tape by an expert reader at a rate of 141 wpm. Two 30 item multiple choice tests were used to measure the amount of comprehension.

In Fairbanks' experiment, independent groups of 36 Air Force Technical School students each were assigned to one of five experimental conditions involving the presentation of recorded messages with 0, 30, 50, 60, and 70 per cent compression. This provided a wpm range of from 141 to 470. Each of the compression group was composed of four subgroups representing different levels of aptitude based on Technical Specialists Aptitude Index. A six group, test only, or 100 per cent compression, took the comprehension test without listening to the basic messages and their scores were used for correction of pre-knowledge.

In the second experiment the effects of redundency (message repetition) and compression upon comprehension scores were studied. A zero compression group and a 50 per cent compression group were used and redundency was at two levels--a single presentation and two presentation. Thus there were four basic groups disregarding aptitude. Within the four basic groups there were four aptitude levels.

In the third experiment the effect of internal redundency of the original message was studied. By splicing into the tape the augmented

portions put into different wording, the message was increased by 1358 words or by 43 per cent. This was called the long version. The listening time was then equal to the presentation time of the original message with zero compression. A group of 38 subjects was assigned to each of four experimental conditions: listening to long or short versions, and zero or 30 per cent compressions. Conclusions arrived at were:

1. Comprehension fell only slightly from 141 to 282 wpm, but with rates beyond 282 wpm it dropped rapidly.

Because of slight drop in comprehension in scores at 282 wpm rate compared to 141 wpm with no time compression, it almost doubled the amount of comprehension in terms of the number of items learned per units of listening time.

2. Two presentations either at the slow rate of 141 wpm or at the fast rate of 282 wpm resulted in substantially greater amount of learning. However, socres of double presentation with 50 per cent time compression and single presentation of zero compression, did not vary significantly.

3. Speeded presentations from 141 to 200 wpm plus the use of the time thus saved for selective repetition of certain items of information did not result in significant effects.

Studies of Reading and Listening Comprehension of Blind

In a study of opinion about the use of compression in recordings for the blind, Iverson (14 ) reports the result of a five question opinionaire given to 45 older blind pupils at the Florida School. The subjects listened to two tape recorded stories--one with a 25 per cent and the other a 50 per cent time compression. Most of the subjects, 42 out of 45, felt that the 25 per cent time compression should be applied to talking book records containing general fiction.

The majority, 34 out of 45, felt that 50 per cent time compression would be too much for fiction type of talking book records. The large majority (39 out of 45) however, felt that time compression should be used on talking book records. No details were given about the composition of the group. Iverson ( 14) indicated that a 35 per cent time compression of talking book records containing fictional material, might be acceptable to the blind and stresses the economy of reading and recording time, storage, transportation, and storage costs which could result if compression were applied. Considering Fairbanks' ( 8 ) findings with technical material, Air Force trainees and 50 per cent compression, Iverson's recommendations for fictional material appears to be conservative. However, in the final analysis such recommendations should be based upon the results of controlled experiments since they have such wide spread practical implications.

Lowenfeld's (19 ) study of braille and talking book reading appears to be the only study so far, which has a rather direct bearing on the listening comprehension of the blind. However, it does not deal with the specific question of learning and retention in relation to differences in word per minute listening rates. The purpose of his investigation was to compare braille reading and talking book listening in rates and resulting comprehension. He also compared variations in talking book presentations (straight, with sound effect, with dramatization) in terms of preference of the blind.

Lowenfeld's experiment consisted of two parts. In the first part 122 third graders and 148 fourth graders from 12 residential schools for the blind were given 24 test lessons selected from McCall-Crabbs Standard Test Lessons in Reading. There were six stories in each of

the following: (a) braille reading in grade one and half, (b) straight talking book, (c) talking book with sound effects, and (d) talking book with dramatization. Braille reading rate, talking book listening rate, and comprehension scores were the dependent variables used for statistical analysis. In the second part of the experiment, 100 sixth graders and 112 seventh graders were given 12 test lessons selected from the same source--six in braille and other six in straight talking book listening. His conclusions are as follows:

1. The medians of braille reading rates for third, fourth and fifth, sixth, and seventh grades were, respectively, 51, 58, 59, 62 wpm. A comparison of braille reading from school to school indicated great differences in median rates at all grade levels. At each grade level the highest median found was about twice the lowest median. The findings also showed that subjects from one school as a group tended to belong either to a high rate or low rate braille reading group. Obviously all the schools did not approach a particular standard in efficiency of braille teaching.

Talking book reading rates in Lowenfeld's experiment was predetermined by the investigator as 171 wpm for third and fourth grades and 158 wpm for sixth and seventh grades. If the two modes of presentations compared on the basis of wpm rates talking book listening appears to be three times as fast as braille reading. In other words, subjects from the four grades had an average rate of braille reading (30, 34, 37, 39 wpm) for 100 words of talking book listening.

When the average reading rates of this study are compared with visual silent reading rates of equivalent grades for seeing students the rate for third grade seeing student is twice as fast, in fourth grade three times faster, in sixth grade about 3.5 times faster, and

in seventh grade four times faster than braille reading.

2. At the third and fourth grade levels, talking book listening comprehension is significantly higher than braille reading comprehension, the difference amounting to about four months in grade score achievement.

3. Comparison of straight talking book material and talking book with sound effect did not indicate any significant differences in comprehension for the material used in this study.

4. At third and fourth grade levels the difference between braille and talking book reading is considerably higher for IQ levels below 90 than for those above 90. It indicates that those at the lower aptitude level comprehend better by listening to talking book than by reading braille. For IQs above 90, although the difference between the two methods is not so large it still is in favor of talking book listening.

5. In the second series of the experiments with sixth and seventh graders, differences in scores of braille and straight talking book was not large and statistically insignificant for the story type of material used. However, in these grades the scores for text book type of material for braille reading was significantly superior to those of talking book listening.

Lowenfeld's ( 19) findings concerning the relative speeds of braille reading vs. talking book listening may be altered considerably if wpm rate of talking book had not been confined to one wpm rate for narrative and another for text book material. For both types of content his predetermined speeds can not be considered close to the ceiling for comprehensibility of talking book materials.

## Statement of Problem

A review of the literature has revealed that there have been several studies which have attempted to determine the effects of speed, difficulty level of the material, redundency, and aptitude upon comprehension of seeing subjects who listen to different types of messages. Some of the studies also attempted to determine the differential effects of the same variables upon reading vs. listening comprehension of the seeing subjects.

At the present time no study appears to be available on the effect of wpm rates on the listening comprehension of blind subjects.

The purpose of the present study is to determine the effects of two different wpm rates (fast-slow) on the learning and retention of blind subjects who listen to long, narrative type of materials.

The problem has been limited to the following questions:

1. Is any learning affected when a group of blind school-aged subjects listen to long narrative type of messages?

2. What is the differential effects of listening to a faster or slower wpm rate on the learning of long, narrative type materials?

3. What is tne differential effects of listening to a faster or slower wpm rate on the retention of such long narrative type of messages 24 hours after?

4. What are the opinions of the blind subjects concerning the story content?

5. What are the preferences of the subjects to the particular speeds of the materials to which they listened?

# Chapter II

# METHODS AND PROCEDURES

In the 12 years since his report, no study followed-up Lowenfeld's (19) finding that blind children can learn more rapidly with talking books than through braille. One obvious and important problem, both theoretically and practically, is that of determining the effect of differences in the word per minute rate of recorded information on the amount learned and remembered by the listener. To study this problem it was necessary to obtain (a) a sample of blind school-aged children, (b) materials at the proper difficulty level, (c) recordings at two different wpm rates, with other factors controlled, and (d) to plan an efficient experiment.

## Selection of the Subjects

Subjects were selected from the Illinois Braille and Sight Saving School for the Blind, Jacksonville, Illinois, which is a residential school operated by the State of Illinois Department of Public Welfare.

In the selection of the subjects the following criteria were used: (a) Total blindness or a maximum vision of light and color perception; those with partial sight or any amount of useful vision were excluded. (b) Normal or above normal IQs; those below an IQ of 89 were excluded. (c) Grade placement ranging between seventh and 10th grade; grades below seventh and above 10th were excluded. (d) Both sexes within the specified grades were included.

On the basis of these criteria 23 boys and girls were selected who had an IQ range of 89-144, and an age range of 13.5 to 17.6. There were 13 girls and 10 goys. The girl-boy ratio of the group was due to unequal representation of the two sexes in the grades from which they were selected.

## Table 1

## Characteristics of the Subjects

| Groups | Number of Subjects | Birthdate | Sex | Grade | IQ |
|---|---|---|---|---|---|
| I | 1 | 7-23-41 | F | 9 | 90 |
| | 2 | 5-12-42 | M | 7 | 93 |
| | 3 | 11- 4-42 | M | 8 | 106 |
| | 4 | 11- 3-43 | M | 9 | 111 |
| | 5 | 8-19-41 | F | 9 | 123 |
| | 6 | 10-17-43 | M | 8 | 132 |
| | 7 | 11-28-42 | M | 9 | 136 |
| II | 8 | 11-17-40 | F | 10 | 89 |
| | 9 | 7-21-42 | F | 8 | 96 |
| | 10 | 10-31-41 | M | 9 | 103 |
| | 11 | 10-20-42 | F | 8 | 113 |
| | 12 | 7-23-44 | F | 7 | 126 |
| | 13 | 10-10-43 | M | 9 | 130 |
| | 14 | 4-16-43 | F | 9 | 144 |
| III | 15 | 9- 1-43 | F | 7 | 90 |
| | 16 | 2-28-43 | F | 8 | 97 |
| | 17 | 9-14-42 | F | 7 | 106 |
| | 18 | 4-15-44 | M | 7 | 107 |
| | 19 | 11-22-41 | F | 10 | 115 |
| | 20 | 3-14-44 | F | 7 | 126 |
| | 21 | 1-18-44 | F | 7 | 132 |

The related data of the subjects are shown in Table 1.

Selection Procedure

With the cooperation of school principle, school records were examined and a tentative list prepared of those who met the above described criteria. Then from the list of the names, individual inquiries were made and volunteers were selected. A nominal payment of fifty cents per individual, per session was found necessary because of these reasons: (a) subjects would have to give up free time for the duration of the experiment, (b) they had to give up parts of two Saturdays, and (c) to prevent the competition of other activities during the two weeks of experimental period which might result in drop-outs. It was understood by the students that the payment due at the end of the experiment could be paid only to those who participated for the duration.

Table 2

Summary of Characteristics
for the Three Groups

| Group | Age (years) |  | Grade |  |  |  | IQ |  | Sex |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  | Mean | Mdn. | 7 | 8 | 9 | 10 | Mean | Mdn. | M | F |
| I | 15.6 | 15.8 | 1 | 2 | 4 | 0 | 113 | 111 | 5 | 2 |
| II | 15.4 | 15.9 | 1 | 2 | 3 | 1 | 114.4 | 113 | 2 | 5 |
| III | 14.7 | 14.3 | 5 | 1 | 0 | 1 | 110.4 | 107 | 1 | 6 |

This measure appeared to be necessary to keep the group intact. As a matter of fact, during the experimental period only one case was lost due to sickness.

The 23 subjects were divided into three groups equated on the basis of mean IQ. Sex ratio of subgroups and grade placement were not equalized because of the limited sample available.

Two of the subgroups, containing eight subjects each, were designated as Group I and Group II and the third group, containing seven subjects, was designated as Group III, control group. As a

result of the one drop-out from Group II, the scores of one subject equivalent in IQ was taken out of Group I. Thus the number of cases in each group was equalized at seven. The ranges and the means of Age, IQ, and grade placement are shown in Table 2.

## Selection and Development of the Materials

### Stories and Tests

Materials for auditory presentation were selected from Book II SRA Better Reading Books (29) series which proposes to have an established readibility level according to Dale-Chall formula. This book, according to its publishers, contains stories at seventh and eighth grade levels. The stories contained in the book were selected from widely read popular magazines and books and edited so as to achieve the grade level of readibility mentioned, without sacrifice of the original style. According to Instructor's Guide (28) which accompanies the stories, the selections have the following characteristics:

1. High reader interest,
2. Wide age range in interest value,
3. They are at a given grade level of readibility,
4. They are exactly the same length in terms of total number of words,[1]

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[1] It should be seen from Table 3 that the total number of words in stories varies considerably, contrary to the publisher's figure of 1350 words per story. One of the sources of variation might have arisen from differences in method of counting. In this study, because the materials were used aurally, all figures were counted on the basis of number of words required to pronounce them, i.e., 72 was as two words, 1785 as three words.

5. They preserve the content and the style of the originals,

6. Each story is followed by 20 items, five part multiple choice test to measure comprehension,

7. Articles have potential ties with one or more of the subjects taught in school.

The test items related to the stories were prepared on the following basis:

1. Each test is composed of 20 items and covers adequately all the important points such as concepts, generalizations, and inferences in the story,

2. Distractors in each item are adequate and not too obvious,

3. Items are completely objective,

4. Test-retest reliability of the tests is not reported.[2]

Out of the 20 stories in Book II, 10 were selected on the basis of their possible interest value and comprehensibility to blind subjects ranging in school grades from seventh through 10th. Table 3 contains relevant data on these 10 stories.

These 10 stories were tape recorded. Two different wpm rates were attempted by a male speaker who was an instructor in the Speech and English departments, University of Illinois.

WPM Rates

The conception of the experiment was to work within the prevalent wpm rates employed in talking book recordings. Therefore as a third

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[2] According to the author, the 20 tests contained in Book II are approximately equivalent in terms of reading difficulty and form and content to the first part of Diagnostic Reading Test, Survey Section. This first part yielded scores for reading rate and for reading comprehension. Average test-retest reliability of the reading rate scores is .80 and for reading comprehension scores is .72. According to the author tests of SRA Better Reading Books tests also may be expected to have approximately the same level of test-retest reliability.

## Table 3

### Description of Stories

| Abbreviated Title | No. in Book* | Serial Number | Length (Number of Words) | Listening time (secs.) Slow | Listening time (secs.) Fast | WPM Rates Fast | WPM Rates Slow |
|---|---|---|---|---|---|---|---|
| Bank | 1 | 1 | 1376 | 474 | 385 | 214.20 | 175.20 |
| Zoo | 3 | 2 | 1376 | 440 | 355 | 232.20 | 187.20 |
| Theatre | 11 | 3 | 1383 | 492 | 415 | 199.80 | 167.40 |
| Census | 13 | 4 | 1400 | 494 | 403 | 208.20 | 172.80 |
| Telephone | 12 | 5 | 1599 | 548 | 475 | 201.60 | 175.20 |
| War | 17 | 6 | 1348 | 465 | 369 | 219.00 | 183.40 |
| Arctic | 15 | 7 | 1348 | 473 | 374 | 216.00 | 170.40 |
| Wolf | 14 | 8 | 1419 | 493 | 393 | 216.00 | 172.20 |
| Guests | 16 | 9 | 1354 | 485 | 401 | 202.20 | 165.60 |
| Bed | 9 | 10 | 1360 | 508 | 420 | 193.80 | 160.20 |

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* See Simpson (28) for text of stories.

step, the attempts were made to determine the wpm rates generally employed in Talking Book recording.

First, the inquiries were made of the Library of Congress and the American Foundation for the Blind. The Library of Congress is the responsible agency in the preparation of Talking Books. It formulates all the policies connected with their production and distribution. The American Foundation for the Blind does much of the actual recording and distribution. As such it also is an influential national agency in such matters. The answers received revealed that there was no policy or specific standard used by these agencies with respect to wpm rates of recording. This matter was entirely left to the reader. (See Appendix D for criterion employed.)

Consequently, a second step was taken to get wpm rate data for Talking Books. In cooperation with the Illinois Braille and Sight Saving School for the Blind at Jacksonville, responsible for the distribution of braille and Talking Book literature in Southern Illinois, 12 Talking Books were selected. According to the librarian's opinion (Miss Moon), these titles were at seventh and eighth grade interest and difficulty levels and the titles were frequently used by the pupils of these grades. Five-minute samples were tape recorded. These passages were first subjected to an aural word count by breaking up the text into blocks of a few seconds at a time; then they were timed with a stop watch and wpm rates for each one was determined. These data are shown in Table 4.

The method employed in the establishment of rates of Talking Book samples is not suitable for a very accurate word count of the samples and the indicated figures in the Table 4 may vary to some extent from the word count of the passages made from ink-print copies. However, the source of error, counting by listening, can be

## Table 4

### WPM Rates of Twelve Talking Book Stories of Interest to Children Above the Sixth Grade

| Title | Topic | WPM Rate |
|---|---|---|
| The Flower Drum Song | Fiction | 160.2 |
| A Compact History of U.S Navy | History | 136.2 |
| Blow the Salt | Fiction | 163.2 |
| Stars and Stripes | Historical Novel | 156.0 |
| Operation Deep Freeze | Travel | 175.8 |
| Walking Love | Fiction | 137.4 |
| Method in Madness | Fiction | 138.6 |
| The Mysterious Stranger | Fiction | 126.2 |
| Because of Madelyn | Fiction | 198.0 |
| The Hell-Bent Kid | Fiction | 163.2 |
| Cold Hazard | Fiction | 156.0 |
| Men on the Buckskin | Fiction | 137.4 |
| | Average | 154.0 |

expected to effect all results in the same direction and may not effect the establishment of degree of variation and approximate range in rate of the samples. The table adequately indicates that a considerable range in rates exists for about the same kind of reading material.

Lowenfeld (19), in his study, suggests that in Talking Books generally a 180 word per minute rate is employed, and in his study for narrative type of material at seventh and eighth grade levels he used a wpm rate of 171. From these data a basic or slow rate of approximately 172 wpm was decided upon for recording the slow versions of the stories. A difference of 37 was selected for the faster rate in accordance with differences used by other investigators. Miller (20), Goldstein (10), Nelson (22), and Harwood (11) used speed steps representing a wpm difference of from 25 to 40.

As will be seen from Table 4, the slow and fast rates of the recordings used in the present study show some variations. However, the distribution of slow rates for the ten stories do not overlap with the distribution of the fast versions of the same stories. This variation in wpm of slow and fast rates appear to be inevitable when the recordings are made through speeding the rate of the reading. In part, this variation is related to the need to retain voice quality (the pitch and intelligibility) in the fast versions of the stories. An effort was made to increase the speed of speech in addition to shortening the pauses.

Content of Tapes

The first item of each tape contained the general direction to the listener (see Appendix C). Next, is the title and the name of the author of the story. This is followed by the story, test directions, and then the test items were the last recorded. Each test question

along with the five alternatives was repeated twice. The rates of test items and directions was constant for fast and slow versions of the stories. One (master) of the test was prepared and the duplicate was made from it by machine recording and spliced on the story tape. The rates for the test items were approximately the same as for slow stories. However, longer intervals were used between individual test items and the alternatives. Consequently, the overall rate appear to be much slower than the slow stories. The test directions for the first story, fast and slow versions, differed from the other nine. It contained a sample item to illustrate the test procedure.

Each test item was repeated twice with an interval of approximately two to three seconds and subjects were told to record their responses at the conclusion of the second repetition.

### Design of the Experiment

In connection with the experimental design, on the first day Experimental Group I heard the fast wpm rate of story one, and the Experimental Group II the slow wpm rate of the same. Immediately following, the two groups, along with the Control Group, who did not hear the story, were tested.

On the second day the two Experimental Groups were first retested from story one, then heard story two, wpm rates reversed between the Experimental Groups, and were tested along with the Control Group.

For the rest of the experimental period, wpm rates were regularly alternated between the Experimental Group I and Experimental Group II. Thus at the termination of twelve days, each subject in the two Experimental Groups had listened to five fast and five slow wpm rate stories, tested and retested. The Control Group had taken the 10 tests without listening to the stories.

One of the constraints in designing the experiment was the limited number of available subjects. The second was the limited time available to them for participation in a research investigation. In addition, there were no standardization data available about the stories and tests when presented orally. These factors were important in the development of the research design that was used.

The primary design, from the point of view of logical priority, was the Lindquist (17) Type I or mixed design. It is considered to be a precise and efficient design to use since it permits one to equalize between limits of individual differences. This could be achieved in the present study since the number of treatments was small enough so that they all could be administered to each subject for one variable but not in all combinations. Thus treatment comparison could be on inter-subject comparison and one on intra-subject comparison. As in all mixed designs the inter-subject comparisons were less precise than the intra-subject comparisons. But the nature of the problem did not permit the use of the wpm rate factor so as to treat it as an intra-subject variable. In this design each story for a group of subjects is used in connection with one wpm rate and each wpm rate is administered to a different group of subjects. To counteract the effects of this confounding the design was repeated but this had to be accomplished with the same subjects assigned to the reverse wpm rate with another set of stories. Thus the comparability of subjects was assured in the duplication of the experiment but the equivalents of the stories had to be assumed on the basis of the method used to equate them in readibility.

This overlapping of the designs was achieved by assigning at

random one group of subjects to the fast wpm version and the other group to the slow wpm version of a story. On the next day the group that listened to the fast wpm rate the first, listened to the slow wpm rate the second day. The reverse sequence was given to the other group. In this way the odd-numbered days represented one experiment and the even-numbered days a second experiment. This is illustrated in Figure 1.

The 12 column headings indicate the 12 days of the experimental period. The first row at the top of the figure is devoted to the Experimental Group I and the order of presentation of wpm rates along with the serial numbers of the stories $F_1$, signifying that Experimental Group I listened to the Fast version of story 1 on the first day of the experiment and $S_2$ signifies listening to slow version of story 2 on the second day of the experiment, and so on.

The second row shows the order of testing of the Group I in relation to each of the stories. The third row contains information concerning the order of retesting of the Group I in relation to each story. As will be noticed, there was no retest for either group on the first day of the experiment.

The second part of the figure is devoted to Experimental Group II for the same purpose. The third section of the figure is concerned with the order of the testing of the Control Group.

It can be noted from the schedule presented in Figure 1 that the first day differed from the others. On that day subjects heard a story and then took a test covering it whereas in all other days they were tested on the previous day's story first, then they listened to a new story and took a test covering it. Group III, the Control Group, took each new test with the other two groups. On the

Figure 1

Schedule Used*

| | | | | | | | Day Number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Group I** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Story Number and wpm rate | $F_1$ | $S_2$ | $F_3$ | $S_4$ | $F_5$ | | $S_6$ | $F_7$ | $S_8$ | $F_9$ | $S_{10}$ | |
| Test Number | 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 | 9 | 10 | |
| Retest Number (24 hrs. later) | | 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 | 9 | 10 |
| Group II | | | | | | | | | | | | |
| Story Number and wpm rate | $S_1$ | $F_2$ | $S_3$ | $F_4$ | $S_5$ | | $F_6$ | $S_7$ | $F_8$ | $S_9$ | $F_{10}$ | |
| Test Number | 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 | 9 | 10 | |
| Retest Number | | 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 | 9 | 10 |
| Group III | | | | | | | | | | | | |
| Test Number | 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 | 9 | 10 | |

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* $F_1$--Story 1, Fast wpm; $S_1$--Story 1, Slow wpm.

sixth and 12th days of the experimental period, the two Experimental Groups were only retested from the previous day's story and did not hear a new story.

Designs

1. 3x5, treatment x level. This design was duplicated twice, once on odd-numbered days and again on even-numbered days. Groups I, II, and III (Control Group) as indicated in Fig. 1, on odd-numbered days would provide data for "fast," "slow," and "control" conditions, respectively. On even-numbered days they would provide data for "slow," "fast," and "control," respectively. These analyses would use raw scores.

2. 2x5, Type I or mixed design. This design also was duplicated twice, once on odd-numbered days and again on even-numbered days. Since the scores for the Control Group could not be corrected. their scores did not figure in this design. On odd-numbered days Group I listened to five stories at fast wpm rates and Group II to the same stories at slow wpm rates. The reverse relationship of groups to rates held on the even-numbered days.

3. 2x7, treatment x subjects analysis. In this design Group I's (N=7) data were to be analyzed separately from Group II (N=7). Using corrected scores Group I's results on odd days were to be compared with the results of even-days for the same group. In this design the same group's scores on different stories would be compared. In the second test, even-days' results for Group II would be compared with the odd-day's results for the same group.

This last analysis is based on the assumption of equality of reading difficulty of the stories employed. If this claim of the author of SRA Better Reading Books, from which the stories were selected, is verified by the results of the first two designs, the third design will be employed.

The three overlapping factorial designs employed in this experiment are, in Lindquist's (17) terminology, a treatment x levels design, a second is a mixed design, his Type I, the third is a treatment x subjects design respectively.

### Experimental Procedure

On the first day of the experiment, 15 minutes prior to the experiment proper, all subjects were given a general orientation to the experiment without reference to its specific purpose. As will be seen in the directions (Appendix C, Directions I), two things were stressed: (a) regular attendance, (b) avoiding discussion of the experiment and materials with each other, with other classmates, or with staff for the duration of the experiment

Experimental sessions were from 4 to 5 p.m. The total time for each session did not exceed a regular class period of 50 minutes--five to nine minutes for stories proper, 18 to 21 minutes for directions and test; the same length of time was used for retest. Total time was approximately 50 minutes. The study started on Monday and went on through Saturday for two weeks. There was a one day interval on Sunday. Thus the study carried a total of 12 days. The two Saturdays were used only for the retest of the previous day's story.

### Experimental rooms

Three classrooms on the second floor of the building were used. Two of the rooms were across the hall at the East wing at the end of a long corridor which was segregated by two doors from the West wing. Groups I and II listened in the East wing room and when it was time, the test-only Group was divided so that three went into the room used by Group I and four into the room used by Group II.

Rooms were familiar to all of the subjects. Desks were placed in a semi-circle around the walls. The teacher's desk was in the center. To the right of the teacher's desk, in the right side corner, the tape recorders were placed on a table. Both were relatively new and in good working condition. Volume and pitch of the instruments were adjusted to the size of the classroom and kept constant throughout the experiment. Ventilation and the temperature of the rooms were comfortable. During the experiment the second floor was not visited by any one and it was kept free of outside disturbances.

The author,with the assistance of a teacher from the Elementary Department of the school,worked with Group I. The author's wife who was intimately familiar with the project, worked simultaneously with Group II. The teacher helped with roll call and with distribution and collection of answer sheets. She notified the control group when testing time came.

Experimental Schedule. Throughout the experimental period, this schedule was followed and a log kept of activities:

1. Checking the tape for the day's story.
2. Setting play-back machines and adjusting the pitch and volume.
3. Receiving the subjects, roll call, and distribution of answer sheets, repeating the directions to write full name and the code of the day's story.
4. Taking retest for previous day's story.
5. Listening to the day's story.
6. Calling in the control group.
7. Testing.
8. Administering the Questions 21 and 22 concerning opinions of the subjects on story content and attitudes toward speed of the stories.(see Appendix C).

9. Collecting and checking the answer sheets.

10. Scoring and filing the answer sheets.

With the exception of ten-minutes delay in both groups on the fourth day of the experiment, everything went in line with the schedule. The delay was due to the fact that two subjects did not report on time.

There were two scheduled variations from this routine: one on the first day of the experiment where there was no retest, and another on the two Saturdays when the subjects were only retested.

The first session, Group I listened to the fast version of story 1 and Group II to the slow version. On each of the following days the wpm rates heard were alternated. Thus the groups heard a fast or slow version on one day and the other wpm on the next day. In 10 days each group heard five stories at the fast and five at the slowwpm rates.

## Scoring Procedure

As indicated earlier, test items were repeated twice. Subjects listened to both repetitions and at the end of the second one, almost simultaneously, recorded their responses either by braille machines or braille slate. They wrote the question number first then the letter (a through e) representing their choice of alternative. To record these answers, braille writers required four strokes which can be completed in 2-3 seconds. Doing it by braille slates takes somewhat longer. It is necessary to punch out the individual dots. However, the student was allowed to use the device with which he was most familiar. At the grade levels involved, students have adequate proficiency and speed of writing to secure timely recording. It was found unnecessary to equalize the number of dots in the lettering

of the choices, because all the subjects had to complete their answers during the brief interval between the items. On the answer sheets of those who used slates no evidence was found to indicate that they had any differential difficulty in recording their answers.

For scoring purpose the keys of the tests were transcribed to braille and answer sheets were checked against these by the author who indicated scores to an assistant. As a second check the responses were read and checked directly from ink-print keys.

Hypotheses. In relation to the problem defined in the first chapter, the following hypotheses were formulated for testing:

Hypothesis I (learning hypothesis)--Blind subjects who listened to stories presented to them will obtain higher score on a multiple choice recognition test than will comparable subjects who do not listen to these stories.

Hypothesis II (learning rate hypothesis)--Blind subjects who listen to stories presented at different wpm rates will learn at different rates so that within limits the faster rate will result in higher test scores per unit of listening time than will the slower wpm rate.

Hypothesis III (retention hypothesis)--Blind subjects who listen to stories presented at two different wpm rates will remember what they have learned 24 hours later in such a way that those who listened to faster presentations will have a higher retention score per unit of listening time than those who listened to the slow presentations.

The first hypothesis is merely a control to determine whether the Experimental Groups had any degree of prior familiarity with

the stories used in the experiment. In order to be able to test the hypotheses on learning rate and retention, which are basic questions related to the problem, learning hypothesis and its testing had to recieve priority over the other two.

## Chapter III

## RESULTS

The results obtained will be presented here in terms of each of the three major hypotheses of the study. Each hypothesis, as tested in null form, will be discussed in terms of the data obtained.

> Hypothesis I (the learning hypothesis)--Blind subjects who listen to stories read to them will obtain higher scores on a multiple choice recognition test than will comparable subjects who do not listen to these stories.

As indicated in Chapter II, the learning hypothesis is for the purpose of determining the degree of prior familiarity and thus serves as control for the other two hypotheses. The raw-test scores (see Appendix A, Table 1) were processed in two separate analyses: one for the first set of five stories and one for the second set of five stories. Each set of stories was assigned to its position on a random basis. Consequently, it was possible for the mean difference in wpm rate to be different for the two sets. Also, each group of subjects served in both analyses. Thus each analysis--that for the first set of five stories and that of the second set of five stories --represented a duplication of the experiment.

With respect to the learning hypothesis we are interested in the differences of the raw scores of the Control Group and each of the Experimental Groups. Significant differences between the Control and each of the Experimental Groups which favors the latter indicates that a significant amount of information was learned from listening.

Tables 1 and 2 present the results of analysis of variance using a Type I design (see Lindquist, 17) with three treatment groups and five stories. In this design each cell contained seven scores,

one per subject in each treatment group. Thus, for five stories there were 35 scores, and a total N of 105. The raw scores on tests were the dependent variable.

Table 1

Summary of Analysis of Variance for Test Scores the First Set of Five Stories

| Source | df | | SS | MS | F |
|---|---|---|---|---|---|
| Between Ss | | 20 | 2294.54 | | |
| wpm rate (B) | 2 | | 1826.36 | 913.18 | 35.10* |
| Error (b) | 18 | | 468.18 | 26.01 | |
| Within Ss | | 84 | 585.60 | | |
| Stories (A) | 4 | | 217.46 | 54.36 | 12.35* |
| Interaction: AxB | 8 | | 50.97 | 6.37 | 1.44 |
| Error (w) | 72 | | 317.17 | 4.40 | |
| Total | | 104 | 2880.14 | | |

---

*Significant beyond the 1 per cent level for the appropriate degrees of freedom.

Table 2

Summary of Analysis of Variance for Test Scores the Second Set of Five Stories

| Source | df | | SS | MS | F |
|---|---|---|---|---|---|
| Between Ss | | 20 | 2526.60 | | |
| wpm rate (B) | 2 | | 2173.33 | 1086.66 | 55.38* |
| Error (b) | 18 | | 353.27 | 19.62 | |
| Within Ss | | 84 | 454.40 | | |
| Stories (A) | 4 | | 82.89 | 20.73 | 4.87* |
| Interaction: AxB | 8 | | 65.01 | 8.12 | 1.91 |
| Error (w) | 72 | | 306.50 | 4.25 | |
| Total | | 104 | 2981.00 | | |

---

*Significant beyond the 1 per cent level for appropriate degrees of freedom.

These data indicate that the groups did differ from each other significantly. F equals 35.10 and 55.38 for the first and second set of five stories respectively.

An analysis of the means of the three groups, Table 3 reveals that both fast and slow treatment groups had higher means than the Control Group. On the other hand, the rank order of the means of three groups for the first of five stories varied from the rank order of the means of the second set of stories. For the first set, it was slow, fast, control; for the second set of five stories it was fast, slow, control from highest to lowest. The second sequence sppears to be more in line with the principle hypothesis of the study, namely that of learning rate.

Table 3
Raw Score Means

| Group | First Set of Five Stories* | | | Second Set of Five Stories** | | |
|---|---|---|---|---|---|---|
| | $\Sigma X$ | $\bar{X}$ | Rank | $\Sigma X$ | $\bar{X}$ | Rank |
| Slow wpm | 539 | 15.40 | 1 | 518 | 14.80 | 2 |
| Fast wpm | 471 | 13.46 | 2 | 568 | 16.22 | 1 |
| Control Group | 201 | 5.74 | 3 | 208 | 5.94 | 3 |

---

*A difference of 2.044 between means is significant beyond the 5 per cent level and of 2.756 is significant beyond the 1 per cent level.

**A difference of 2.04 between means is significant beyond the 5 per cent level and of 2.74 is significant beyond the 1 per cent level.

> Hypothesis II (the learning rate hypothesis)--Blind subjects who listen to stories read at two different wpm rates will learn at different rates so that within limits, the faster rate will result in higher test scores per unit of listening time than will the slower wpm rate.

Corrected Test Scores

Raw scores obtained on a story divided by the total delivery time of that story were processed in two separate analyses: one for the first set of five stories and one for the second set of five stories (see Appendix A, Table 2). Each story was assigned to its set and position in a set on random basis. Consequently, it was

possible for the mean difference in wpm rate to be different for the two sets. Also both of the experimental groups served in both analyses. Thus each analysis--that for the first set of five stories and that for the second set of five stories--represented a duplication of the experiment.

With respect to the learning rate hypothesis, we are interested in the differences between the corrected test scores of the fast and slow treatment groups. Tables 4 and 5 represent the results of the two variance analysis using a Type I design (see Lindquist, 17) with two treatment groups and five stories in each. In each analysis every cell contained seven scores, each treatment 35 scores, and a total N=70.

Table 4

Summary of Analysis of Variance for Corrected Test Scores the First Set of Five Stories

| Source | df | SS | MS | F |
|---|---|---|---|---|
| Between Ss | 13 | 7.58 | | |
| wpm rate (B) | 1 | .13 | .13 | .21 |
| Error (b) | 12 | 7.45 | .62 | |
| Within Ss | 56 | 6.92 | | |
| Stories (A) | 4 | 2.00 | .500 | 5.102* |
| Interaction: AxB | 4 | .17 | .042 | .428 |
| Error | 48 | 4.75 | .098 | |
| Total | 69 | 14.50 | | |

---

*Significant beyond the 1 per cent level.

With the first set of five stories the difference between group scores did not reach significance, indicating that in the amount of learning per unit of listening time the fast treatment group was not superior to the slow treatment group to a significant extent. Thus, as far as the results of the first analysis are concerned, the null hypothesis could not be rejected. However, the results of the

second analysis are at variance with those of the first. With the second set of five stories between the fast and slow treatment groups reached significance beyond the one per cent level (F=17.59) for one and 12 df. In neither analysis was the interaction between the wpm rate and story variables significant. On the other hand, the variance associated with stories was significant beyond one per cent in both analyses.

Table 5

Summary of Analysis of Variance for Corrected Test Scores the Second Set of Five Stories

| Source | df | SS | MS | F |
|---|---|---|---|---|
| Between Ss | 13 | 14.378 | | |
| wpm rate (B) | 1 | 8.547 | 8.55 | 17.59* |
| Error (b) | 12 | 5.231 | .49 | |
| Within Ss | 56 | 7.156 | | |
| Stories (A) | 4 | 2.402 | .600 | 7.177* |
| Interaction: AxB | 4 | .740 | .185 | |
| Error (w) | 48 | 4.014 | .084 | |
| Total | 69 | 21.534 | | |

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*Significant beyond the 1 per cent level.

The learning rate hypothesis could have been tested through a 2 x 7 treatment x subject design in which the corrected test scores obtained on the five fast wpm stories heard by a group could be compared with the group's scores on the five slow wpm stories. However, this analysis could not be made since it depends for its interpretation on the assumption that the stories were of the same difficulty level. This assumption was proved false by the highly significant variance associated with the stories in the two analyses just reported.

Sign-test. In order to determine whether the direction of the effects of fast and slow wpm rates was significantly consistent

for the 10 stories and for the group of 14 subjects, two sign tests were run..(See Appendix A, Tables 3 and 4) In one, the mean corrected test scores of the 10 fast wpm versions were compared with those of the 10 slow wpm versions. Each mean represented the averages of seven subjects. The second sign test was used upon the mean corrected test scores of each of 14 subjects who obtained scores on the five fast wpm versions and on five slow wpm versions of the stories.

The results of both sign tests were significant, p equals .02 level (one minus, nine pluses) and .002 level (one minus, 13 pluses) respectively for a two-tailed test. These results indicate that the scores associated with the fast wpm versions were significantly and consistently higher than those associated with the slow wpm versions. These findings lend support to the second hypothesis. These results from the second sign test are particularly interesting since story variance was found to be significant in the analysis of variance. In this sign test each subject's mean was based upon a different set of five stories.

> Hypothesis III (the retention hypothesis)--Blind subjects listening to stories presented at a fast wpm rate after 24 hours will remember better what they have learned than will subjects who listened to the slow wpm versions.

The corrected retest scores (see Appendix A, Tables 7 and 8) (raw retest scores obtained on a story divided by the total delivery time of that particular story) were processed in two different analyses, one for the first set of five stories and the other for the second set of five stories.

With respect to retention hypothesis we are interested in the differences between the corrected retest scores of fast wpm treatment

group and the slow wpm treatment group when they are based in each case on the same set of five stories. Tables 6 and 7 present the results of analysis of variance using a Type I design (see Lindquist, 17) with two treatment groups and five stories. In each of the designs, each cell contained seven retest corrected scores, 35 scores for each treatment group and N=70.

Table 6

Summary of Analysis of Variance for Corrected Retest Scores
the First Set of Five Stories

| Source | df | | SS | MS | F |
|---|---|---|---|---|---|
| Between Ss | | 13 | 6.62 | | |
| wpm rate (B) | 1 | | 0.13 | .13 | .24 |
| Error (b) | 12 | | 6.49 | .54 | |
| Within Ss | | 56 | 4.69 | | |
| Stories (A) | 4 | | 1.61 | .402 | 6.813* |
| Interaction: AxB | 4 | | 0.21 | .052 | .88 |
| Error | 48 | | 2.87 | .059 | |
| Total | | 69 | 11.31 | | |

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*Significant beyond the 1 per cent level for the appropriate degrees of freedom.

Table 7

Summary of Analysis of Variance for Correct Retest Scores
the Second Set of Five Stories

| Source | df | | SS | MS | F |
|---|---|---|---|---|---|
| Between Ss | | 13 | 11.40 | | |
| wpm rate (B) | 1 | | 5.55 | 5.55 | 11.40* |
| error (b) | 12 | | 5.85 | .49 | |
| Within Ss | | 56 | 5.74 | | |
| Stories (A) | 4 | | 2.58 | .645 | 10.57* |
| Interaction: AxB | 4 | | .19 | .047 | .77 |
| Error | 48 | | 2.97 | .061 | |
| Total | | 69 | 17.14 | | |

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*Significant beyond the 1 per cent level for the appropriate degree of freedom.

The two analyses did not reach the same level of significance. The analysis of variance of the data from the first set of five stories did not reach the five per cent level for the wpm variable F=.24. Thus the null hypothesis could not be rejected. In this analysis the interaction between the wpm and story variables also was found to be insignificant, F=.88. However, the story variable reached significance (F=6.813) beyond the one per cent level.

In the analysis with the second set of five stories, the difference between the two wpm rates reached significance beyond one per cent level, F 11.40. These data indicate that for these stories there was a significantly greater amount of retention per unit of listening time with the faster wpm rate than with the slower wpm rate. In this analysis the interaction between wpm and story variables did not reach significance. The variance associated with stories reached significance beyond one per cent level, F=10.57.

Sign Test

To determine whether the trend favoring the fast wpm versions, revealed in the analysis of the second set of stories prevailed throughout the whole series, but simply failed to reach significant magnitude in the first set of stories, two sign tests were run. (See Appendix A, Tables 7 and 8.) In one of these, the mean corrected retest scores obtained on a fast wpm version by each of 14 subjects was compared with the subject's mean on the slow wpm version. In the other, mean corrected retest scores obtained by a group of seven subjects who listened to the fast wpm version was compared with that obtained by another group on the slow wpm version of the same stories.

In the first analysis there was a single reversal of sign (one minus, 13 pluses). With 14 comparisons, this is significant at .002 level.

In the second analysis, there was one reversal of sign (one minus, nine pluses). With 10 comparisons this result is significant at .02 level.

These findings indicate that the trend of obtaining higher retest scores on the faster wpm rates, compared to the slower wpm rate, per unit of listening time, operated throughout the whole series of stories and subjects. Only the differences for the first set of five stories were too small to reach significance in the analysis of variance.

Opinions About Story Content

At the end of each 20 item test the subjects were asked to answer two additional questions. Question 21 asked the subject if he liked that particular story (see Appendix B, Table 1). It was intended to determine the opinions of the subjects concerning the content of the stories. The analysis of the responses to this question was accomplished by assigning ordinal numbers to the three response possibilities and adding these to obtain a total score for the five wpm versions and for the slow wpm versions. Two sign tests were run on the differences between these scores In the first, fast, and slow versions of the 10 stories were compared. In the other the totals of responses to each of five fast and five slow stories were compared for the 14 subjects (see Appendix B, Tables 2 and 3).

The three possible alternatives were: (1) I did not like this story as well as the stories I have read and heard, (2) I liked it as well, and (3) I liked it better. To obtain score values, 1, 2, and 3, respectively were assigned these alternatives. In the first

analysis, the sum of values for the seven responses to question one after listening to the fast wpm version of the story was compared with the sum of the values of responses to this question after the slow versions of the ten stories. In the second analysis, the sum of scores assigned to the responses to question 21 after listening to each of the five fast wpm stories by one subject was compared with the sum of five responses made to this question after listening to the five slow wpm stories, for the 14 subjects.

On the first sign test the mean of the 10 stories did not show significant differences. This indicates that in the opinions of the subjects the content of the fast wpm stories was not different from that of the slow wpm stories.

A percentage breakdown of the responses reveals that out of the 70 possible responses to question 21, 55.7 per cent were "as well as," 20 per cent "better than," and 24.3 per cent "not as well as" when the stories were heard at the fast wpm rates. For the slow wpm rates 45.6 per cent of the responses were "as well as," 25,7 per cent were "better than," and 28.6 per cent were "not as well as." These percentages adequately indicate that, in the opinions of the subjects, the content of the stories do not bear any systematic relation to either the fast or slow wom rate heard.

The result of the second comparison, based upon a comparison of 14 means for the slow and fast presentation were not significant.

### Attitudes About wpm Rates

In order to analyze the responses to question 22, given at the end of each test, two sign tests were used (see Appendix B, Tables 5 and 6). This question was used to determine attitudes of the subjects toward the particular speed of the story (see Appendix B, Table 4). The three possible alternatives were: (1) should be

slower, (2) is satisfactory, and (3) should be faster. They were assigned values of 1, 2, and 3 respectively.

In the first analysis, each of the 14 subject's sum on the five fast wpm stories were compared with the sum of the five slow wpm stories. If the sum of the faster stories was larger, a plus sign was assigned to the comparison and when the sum for slow was larger than fast, a minus sign was assigned.

In the second analysis, the sum of seven responses to fast version of each story was compared with the sum of seven responses to the slow version. If the sum for the fast wpm version was larger, a plus was assigned to the comparison, and if the sum of slow wpm version was larger, a minus was assigned.

The result of first analysis was significant, $p > .002$ (four zeroes 10 minuses). The meaning of the comparison is indicated in the breakdown of total responses. Of the 70 responses made by 14 subjects to 10 slow versions of the stories, 90 per cent were "satisfactory," 5.7 per cent were "should be slower," and 4.3 per cent "should be faster." On the other hand, to fast wpm rate 64.3 per cent were "satisfactory," 32.8 per cent were "should be slower" and 2.8 per cent were "should be faster." From this comparison it is clear that many more "satisfactory" responses were made to the slower wpm versions of the stories than to the faster wpm versions.

The result of the second analysis, comparing the sums for 10 fast stories with the sums for ten slow stories was found to be significant at the .016 level (three zeroes, seven minuses) in favor of the fast rate.

The breakdown of the total responses indicate the same percentages as in the previous analysis.

## Summary

The findings may be summarized as follows:

1. The two analysis of variance using three treatment groups and five stories provide adequate evidence (F=35.10 and 55.38, respectively) that the two experimental groups learned significantly through listening to fast and slow wpm rates. Both experimental groups in both analyses obtained significantly higher scores than the Control Group. Thus the null hypothesis concerning learning was rejected. This means that the experimental groups were not familiar with the stories.

2. The two analysis of variance employing two treatment (fast and slow wpm rates) and five stories in each, provide the same evidence in support of learning rate hypothesis. F=.21 and F=17.59 for the first and second analysis, respectively, the second of which was significantly beyond .01 level. The results of the first analysis, however, indicate that the null hypothesis should be retained. The learning rate hypothesis also was examined in terms of degree of consistency with which the means of the fast wpm versions exceeded those based upon the slow wpm versions. Results of the two sign tests (one on mean corrected test scores of 14 subjects on fast and slow stories, and the other on the means of 10 fast and 10 slow stories) support the learning rate hypothesis. Thus it appears that the differences in means for the first set of five stories was in the same direction as that obtained with the second set, but was too small to reach significance. This means that there is enough evidence indicating more learning per unit of listening time through listening to fast wpm rates.

3. The results of the two variance analyses of the corrected retest scores (two treatment groups and five stories) were like

those obtained with the test scores. The analysis of variance on the scores of first set of five stories resulted in an F=.24 for wpm rate which was not significant. In the analysis of the second set of five stories F=11.40 for wpm. This is significant beyond one per cent level. Examination of the means indicates that there was, for these stories, significantly greater retention per unit of listening time from listening to faster wpm rates than from listening to slower wpm rates.

The results of the two sign tests comparing the means of corrected retest scores of 14 subjects and that of 10 stories, reveal the same trend, namely, greater retention per unit of listening time with faster wpm. This effect operated throughout the series of stories and however the magnitude of the differences with the first set of stories was too small to reach significance in the analysis of variance.

4. The analysis of the responses to question 21 indicated that in the perception of the listeners there was no significant relationship between story content and wpm rates.

5. The analysis of the responses to question 22, revealed that in the opinion of the subjects toward the particular speed of the stories many more (90 per cent) expressed preference to the slower wpm rates than to the faster wpm rate (64.3 per cent).

# Chapter IV

## SUMMARY AND CONSLUSIONS

The problem of this investigation was to study the learning and retention effects on blind school children of listening to relatively long narrative type of material at two different wpm rates, as measured by comprehension test scores. The purpose was to determine whether learning efficiency would be enhanced through the use of faster word per minute rates than the usual rate of the average talking book used by blind people.

Twenty one blind subjects from the Illinois Braille and Sight Saving School for the Blind, at Jacksonville, Illinois, were selected. Subjects ranged in IQ from 89 to 144 and in grade placement from seventh through 10th grade. The main group was divided into three subgroups--seven subjects in each--equated in mean IQ 113, 114.4, and 110, respectively. The groups were randomly designated as Experimental Group I, Experimental Group II, and the Control Group, respectively. The analysis of the data involved the use of Lindquist's (17) Type I mixed design, his treatment x level design, and the sign test.

For 10 of a series of 12 consequtive days the two Experimental Groups listened to 10 stories recorded on tapes and taken from the SRA Better Reading Books Series, Book 2. The series was tape recorded once at approximately 173 wpm, commonly used with talking books, while a second time they were taped at an average of 37 wpm faster. Following the listening period subjects answered 20 multiple-choice questions. 24 hours later the test was repeated. They then listened to another story and were tested. The Control Group took the 20 tests without listening to the stories. Experimental Groups expressed their opinions about story content and the speed in response to question 21 and 22. Responses were recorded by braille writers and slates.

## Results

The major results of this study may be summarized as follows:

1. As a check on the familiarity of the materials, the Control Group (subjects who took the tests but did not hear the stories) were significantly inferior to the two groups who heard the stories.

2. The efficiency of faster wpm rates for immediate learning per unit of listening time was indicated by the following:

    a. There was a significant difference in favor of the fast wpm rate for the second set of five stories using the F test.

    b. The direction of the differences in mean was sufficiently and consistently in favor of the fast wpm rate for both the first and the second set of five stories that a sign test exceeded the 1 per cent level.

    c. Apparently the magnitude of the differences of the fast wpm rates for the first set of five stories was not sufficient, although consistent in direction, to reach significance at the 5 per cent level.

3. Retention after 24 hours, as measured by a repetition of the test showed the following results:

    a. There was a significant difference in favor of fast wpm rate for the second set of five stories using the F test.

    b. The direction of the differences in mean was sufficiently and consistently in favor of fast wpm rate for both the first and the second set of five stories that a sign test exceeded the 1 per cent level.

    c. Apparently the magnitude of the differences of the fast wpm rates for the first set of five stories was not sufficient, although consistent in direction, to reach

significance at the 5 per cent level.

4. The tests on the opinions of the subjects concerning the story contents did not show any significant relationship between liking and disliking the story and the fast or slow wpm rates.

5. The subjects generally liked both wpm rates, but preferred the slow rate, as satisfactory, more often than fast rate. The sign test showed a statistically significant difference on this factor.

## Discussion

### Learning Rate

The differences between the results of analysis on the first set of five stories and that of the second set of five stories requires interpretation. The possible reasons for not obtaining a significant F for wpm rates with the first set of five stories is partly indicated by the comparison of the sources of variation in the two analyses. Within group variances for both sets of stories remains approximately the same--7.92 and 7.156, respectively. The error terms also do not vary--4.75 and 4.14, respectively. But the variance for the second set of stories was almost double between subjects, 14.37 and 7.58, respectively. This indicates that the greater part of the variance differences between sets of stories was associated with the between subjects variance. Since the two sign tests revealed that a significant number of individuals and of stories were affected in the same way by the wpm variable, but in different degrees, it would appear that this variable was consistently effective but under the conditions obtained in the first set of stories it failed to reach significance. Thus it would appear that it would be possible to sharpen the effects of wpm variable by increasing the number of subjects in the experiment. With groups containing more

subjects and over a wider range of IQ, the effects of wpm variable probably would achieve significance. Group II who obtained higher mean scores on five fast and five slow stories than Group I had an IQ range of 89 to 144 as compared with 90 to 136 for Group I.

Another possible factor that may account for the discrepency in the results may be the wpm rates and the size of the difference between the two wpm rates used. An investigation of tables (4) reveals that the two wpm rates represent considerable ranges. They almost become a continuous distribution from 160.20 to 187.02 for slows and 192.80 to 232.20 for the fasts. A 6.78 wpm difference obtained between the two rate ranges. Wpm interval between the fast-slow versions of the stories ranged from a low of 28.40 to a high of 46.40 with a mean of 37.60. Although in the present experiment random assignment of the stories to their positions was used to obtain equal variations, some differences as noted did appear. In the two sets the speeds were reversed between the groups regularly to provide a consistent pattern of the rates through the whole series for both groups. The wider wpm interval than the average of 37.60 between the two versions might have helped to sharpen the effects of two wpm rates with the first set of five stories. In the first set the average wpm difference was below 37 and in the second set it was above this value.

The previous investigations of Goldstein (10), Nelson (22), Harwood (11), and others employed arbitrary wpm intervals ranging between 20-37 wpm. Miller (20) had selected a 30 wpm interval between his slow and average rate and 40 wpm between average and fast rate after studying the speaking rate of 92 Air Force instructors. These findings on the effects of rates either altogether failed or was only able to indicate a slight but generally insignificant

relation between wpm steps and comprehension. Only Fairbanks'(8) study with 50 per cent compression representing a 141 wpm difference between his basic rate of 141 and 282 was able to indicate clearly the effect of wpm on comprehension.

It is clear now that the compression method, developed by Fairbanks and his associates, is the most suitable available technique to manipulate wpm variable effectively in such studies. By this method, moving from a basic rate, it is possible to reach wpm rates inaccessible to speeded speech by a human speaker. Thus it will be possible to study the maximum rates of comprehensibility of speech for various types of materials.

The employment of more than two wpm rates is another point to be considered in such an experiment. In relation to this question it should be indicated that the establishment of two or more wpm rates by acceleration of speaker's rate is not an effective technique. Because of possible introduction of uncontrolled variables such as unintelligibility of phonetic units, the faster speeds in the present study had to be limited.

Comparisons of test and retest means of 10 fast and 10 slow stories is somewhat in variance with the results of conventional studies on reminiscence. These had found more reminiscence taking place with mass practice compared with the distributed practice. If we accept the fast rate stories equivalent to mass practice, the findings of the present study show somewhat less reminiscence with fast wpm rate stories than with slow wpm rate stories. Although the differences, indicated by two sign tests on the two series of means, is not statistically significant this variation requires some interpretation.

Part of the reason for this may be found in the nature of the

test items. A scrutiny of the test items related to each story reveal that a few of the items in each test is related to specific details mentioned in the text. For instance, names of the individuals and places, figures and dates, descriptions and the like are used. Such specific details may escape the listener more often with the fast wpm rates than it will with the slow wpm rate. However, this assumption requires verification through further investigation.

Another point requiring disucssion relates to the materials used. The publisher of SRA Better Reading Books proposed that the stories contained in the series were equated in difficulty by the Dale-Chall readability formula. The results of the analysis of variance in this study consistently indicated that the variance associated with the stories reached significance beyond the one per cent level, indicating that the difficulty levels of the stories employed were not equal. Because of this fact, treating subjects' fast-slow scores in a treatment x subjects design had to be abandoned.

These results indicate that either available readability formulas are not yet adequate measures to establish readability difficulty levels or they do not apply always to the listening situations.

The results of this experiment has presented partial evidence that increasing the rate of recording for talking books does not interfere with the comprehension of materials in blind adolescent subjects. Stated in other words, the efficiency of learning and retention is enhanced in terms of units of listening time. These results should be followed-up with further research since their implications will be of benefit to the education of the blind.

Agencies responsible for formulating policies for talking books would do well to establish more suitable wpm standards than now exist. Through the use of compression techniques being developed by

Fairbanks' (8) more efficient use of increased rates of recording can be effected. Such increases in wpm will be of benefit to the reader in terms of knowledge per unit of time as well as significant economy in manufacturing talking books.

Further research on this problem. Fairbanks, et al., compression technique to determine: (a) the most effective wpm rate for different types of materials for adults, (b) the most efficient wpm rate for different groups of school-aged children listening to different materials, (c) the maximum rates for comprehensibility of different types of materials, (d) the possible relations of sex differences with wpm rates, and (e) the extent to which learning efficiency can be improved through different training techniques.

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# Appendix A

## Table 1

### Test Scores for Groups I, II, and III

| Group No. | S No. | Version | 1 | 3 | 5 | 7 | 9 | Version | 2 | 4 | 6 | 8 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | 1 | F | 7 | 8 | 12 | 3 | 14 | S | 6 | 8 | 10 | 10 | 17 |
| | 2 | F | 12 | 13 | 15 | 5 | 12 | S | 10 | 12 | 12 | 13 | 15 |
| | 3 | F | 13 | 18 | 16 | 13 | 14 | S | 15 | 15 | 16 | 12 | 18 |
| | 4 | F | 12 | 13 | 14 | 11 | 14 | S | 17 | 13 | 16 | 13 | 19 |
| | 5 | F | 13 | 19 | 17 | 15 | 17 | S | 17 | 15 | 16 | 16 | 18 |
| | 6 | F | 16 | 13 | 11 | 15 | 13 | S | 16 | 16 | 14 | 16 | 19 |
| | 7 | F | 18 | 18 | 18 | 15 | 14 | S | 20 | 18 | 17 | 16 | 17 |
| II | 8 | S | 10 | 12 | 14 | 9 | 14 | F | 18 | 13 | 16 | 11 | 17 |
| | 9 | S | 13 | 19 | 15 | 11 | 17 | F | 15 | 17 | 12 | 10 | 17 |
| | 10 | S | 13 | 19 | 14 | 6 | 13 | F | 18 | 10 | 10 | 16 | 17 |
| | 11 | S | 15 | 16 | 16 | 14 | 19 | F | 19 | 14 | 19 | 16 | 17 |
| | 12 | S | 17 | 19 | 16 | 18 | 16 | F | 16 | 17 | 14 | 15 | 18 |
| | 13 | S | 16 | 19 | 19 | 14 | 18 | F | 19 | 18 | 18 | 17 | 18 |
| | 14 | S | 16 | 20 | 20 | 14 | 18 | F | 19 | 19 | 20 | 18 | 20 |
| III | 15 | - | 1 | 6 | 7 | 4 | 7 | - | 6 | 5 | 4 | 4 | 4 |
| | 16 | - | 4 | 4 | 11 | 1 | 5 | - | 6 | 5 | 4 | 4 | 4 |
| | 17 | - | 6 | 8 | 6 | 7 | 5 | - | 5 | 11 | 3 | 2 | 4 |
| | 18 | - | 6 | 5 | 8 | 4 | 2 | - | 4 | 6 | 6 | 10 | 7 |
| | 19 | - | 4 | 7 | 11 | 5 | 4 | - | 7 | 9 | 8 | 6 | 3 |
| | 20 | - | 11 | 10 | 10 | 6 | 8 | - | 9 | 7 | 6 | 4 | 10 |
| | 21 | - | 3 | 3 | 6 | 3 | 3 | - | 9 | 7 | 7 | 4 | 8 |

## Table 2

### Corrected Test Scores for Groups I and II*

| Story No. | WPM rate | Group I Subjects | | | | | | | Group I Total |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 1 | F | 1.09 | 1.87 | 2.03 | 1.87 | 2.03 | 2.50 | 2.81 | 14.20 |
| 3 | F | 1.15 | 1.87 | 2.59 | 1.87 | 2.74 | 1.87 | 2.59 | 14.68 |
| 5 | F | 1.51 | 1.89 | 2.02 | 1.76 | 2.14 | 1.39 | 2.27 | 12.98 |
| 7 | F | .48 | .80 | 2.08 | 1.76 | 2.40 | 2.40 | 2.40 | 12.32 |
| 9 | F | 2.10 | 1.80 | 2.10 | 2.10 | 2.55 | 1.95 | 2.10 | 14.70 |
| 2 | S | .78 | 1,26 | 1.89 | 2.14 | 2.14 | 2.02 | 2.52 | 12.75 |
| 4 | S | .98 | 1.46 | 1.83 | 1.59 | 1.83 | 1.95 | 2.20 | 11.84 |
| 6 | S | 1.29 | 1.55 | 2.06 | 2.06 | 2.06 | 1.81 | 2.19 | 13.02 |
| 8 | S | 1.22 | 1.59 | 1.46 | 1.59 | 1.95 | 1.95 | 1.95 | 11.71 |
| 10 | S | 2.01 | 1.77 | 2.12 | 2.24 | 2.12 | 2.24 | 2.01 | 14.51 |

| Story No. | WPM rate | Group II Subjects | | | | | | | Group II Total |
|---|---|---|---|---|---|---|---|---|---|
| | | 8 | 9 | 10 | 11 | 12 | 13 | 14 | |
| 2 | F | 3.04 | 2.54 | 3.04 | 3.21 | 2.70 | 3.21 | 3.21 | 21.95 |
| 4 | F | 1.94 | 2.53 | 1.49 | 2.09 | 2.53 | 2.68 | 2.85 | 16.09 |
| 6 | F | 2.61 | 1.96 | 1.63 | 3.10 | 2.28 | 2.93 | 3.26 | 17.77 |
| 8 | F | 1.68 | 1.53 | 2.45 | 2.45 | 2.30 | 2.60 | 2.75 | 15.76 |
| 10 | F | 2.43 | 2.43 | 2.43 | 2.43 | 2.59 | 2.57 | 2.86 | 17.72 |
| 1 | S | 1.29 | 1.68 | 1.68 | 1.94 | 2.19 | 2.06 | 2.06 | 12.90 |
| 3 | S | 1.46 | 2.32 | 2.32 | 1.95 | 2.32 | 2.32 | 2.44 | 15.13 |
| 5 | S | 1.54 | 1.65 | 1.54 | 1.76 | 1.76 | 2.09 | 2.20 | 12.54 |
| 7 | S | 1.14 | 1.40 | .76 | 1.78 | 2.29 | 1.78 | 1.78 | 10.93 |
| 9 | S | 1.74 | 2.11 | 1.61 | 2.36 | 1.98 | 2.23 | 2.23 | 14.26 |

---

*See Table 1 for raw scores and Table 3 for the listening times for each version (WPM rate) of each story.

### Table 3

### Sign Test on the Mean Corrected Scores of Fast and Slow Versions of Ten Stories

| Story Number | Fast wpm Version | Slow wpm Version | Sign* |
|---|---|---|---|
| 1 | 2.028 | 1.842 | + |
| 2 | 3.035 | 1.821 | + |
| 3 | 2.097 | 2.161 | — |
| 4 | 2.298 | 1.691 | + |
| 5 | 1.854 | 1.791 | + |
| 6 | 2.538 | 1.860 | + |
| 7 | 1.760 | 1.561 | + |
| 8 | 2.251 | 1.672 | + |
| 9 | 2.100 | 2.031 | + |
| 10 | 2.531 | 2.072 | + |

---

*One out of 10 have a p of .02 for a two tailed test (see Seigel)

## Table 4

### Sign Test
### Mean Scores of 14 Subjects on Fast-Slow Stories

| Subject | Fast wpm Versions Mean | Mean | Slow wpm Versions Sign* |
|---|---|---|---|
| 1 | 1.266 | 1.256 | + |
| 2 | 1.646 | 1.526 | + |
| 3 | 2.164 | 1.872 | + |
| 4 | 1.872 | 1.924 | − |
| 5 | 2.372 | 2.020 | + |
| 6 | 2.022 | 1.792 | + |
| 7 | 2.434 | 2.174 | + |
| 8 | 2.340 | 1.434 | + |
| 9 | 2.198 | 1.832 | + |
| 10 | 2.208 | 1.582 | + |
| 11 | 2.656 | 1.958 | + |
| 12 | 2.480 | 2.108 | + |
| 13 | 2.618 | 2.096 | + |
| 14 | 3.006 | 2.142 | + |

---

*One out of 14 has a p of .002 for a two tailed test (see Seigel)

## Table 5

Raw Retest Scores of Experimental Groups I and II

|  | Story 1 |  |  |  |  |  |  | Story 3 |  |  |  |  |  |  | Story 5 |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | N=7 |  |  |  |  |  |  | N=7 |  |  |  |  |  |  | N=7 |  |  |  |  |  |  |
| (Fast) Group I | 8 | 12 | 13 | 13 | 14 | 16 | 17 | 9 | 10 | 18 | 16 | 17 | 16 | 19 | 13 | 13 | 16 | 16 | 18 | 14 | 18 |
| (Slow) Group II | 11 | 14 | 16 | 16 | 19 | 17 | 16 | 19 | 17 | 17 | 17 | 19 | 20 | 19 | 14 | 17 | 15 | 17 | 19 | 19 | 20 |

|  | Story 7 |  |  |  |  |  |  | Story 9 |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | N=7 |  |  |  |  |  |  | N=7 |  |  |  |  |  |  |
| (Fast) Group I | 7 | 6 | 13 | 11 | 16 | 14 | 14 | 15 | 11 | 11 | 17 | 18 | 16 | 17 |
| (Slow) Group II | 9 | 13 | 9 | 14 | 16 | 17 | 15 | 13 | 16 | 15 | 18 | 18 | 17 | 18 |

|  | Story 2 |  |  |  |  |  |  | Story 4 |  |  |  |  |  |  | Story 6 |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | N=7 |  |  |  |  |  |  | N=7 |  |  |  |  |  |  | N=7 |  |  |  |  |  |  |
| (Slow) Group I | 9 | 12 | 14 | 17 | 18 | 18 | 20 | 7 | 19 | 15 | 15 | 16 | 16 | 18 | 11 | 14 | 18 | 16 | 16 | 14 | 16 |
| (Fast) Group II | 15 | 13 | 17 | 17 | 17 | 20 | 18 | 14 | 14 | 13 | 15 | 16 | 18 | 19 | 14 | 13 | 13 | 17 | 16 | 18 | 19 |

|  | Story 8 |  |  |  |  |  |  | Story 10 |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | N=7 |  |  |  |  |  |  | N=7 |  |  |  |  |  |  |
| (Slow) Group I | 8 | 13 | 13 | 13 | 17 | 16 | 15 | 20 | 15 | 18 | 19 | 20 | 17 | 19 |
| (Fast) Group II | 10 | 11 | 14 | 15 | 16 | 17 | 18 | 14 | 17 | 19 | 19 | 18 | 20 | 20 |

## Table 6

## Corrected Retest Scores for Groups I and II*

| Story No. | WPM rate | Group I Subjects 1 | 2 | 3 | 4 | 5 | 6 | 7 | Group I Total |
|---|---|---|---|---|---|---|---|---|---|
| 1 | F | 1.25 | 1.87 | 2.03 | 2.03 | 2.18 | 2.50 | 2.65 | 14.51 |
| 3 | F | 1.30 | 1.44 | 2.50 | 2.30 | 2.45 | 2.30 | 2.74 | 15.12 |
| 5 | F | 1.64 | 1.64 | 2.02 | 2.02 | 2.27 | 1.76 | 2.27 | 13.62 |
| 7 | F | 1.12 | .96 | 2.08 | 1.76 | 2.56 | 2.24 | 2.24 | 12.96 |
| 9 | F | 2.25 | 1.65 | 1.65 | 2.55 | 2.70 | 2.40 | 2.55 | 15.75 |
| 2 | S | 1.22 | 1.63 | 1.90 | 2.31 | 2.45 | 2.45 | 2.72 | 14.68 |
| 4 | S | .85 | 2.32 | 1.83 | 1.83 | 1.95 | 1.95 | 2.20 | 12.93 |
| 6 | S | 1.42 | 1.81 | 2.32 | 2.06 | 2.06 | 1.81 | 2.06 | 13.54 |
| 8 | S | .98 | 1.59 | 1.59 | 1.59 | 2.07 | 1.95 | 1.83 | 11.60 |
| 10 | S | 2.36 | 1.77 | 2.12 | 2.24 | 2.36 | 2.01 | 2.24 | 15.10 |

| Story No. | WPM rate | Group II Subjects 8 | 9 | 10 | 11 | 12 | 13 | 14 | Group II Total |
|---|---|---|---|---|---|---|---|---|---|
| 2 | F | 2.54 | 2.20 | 2.87 | 2.87 | 2.87 | 3.38 | 3.04 | 19.77 |
| 4 | F | 2.09 | 2.09 | 1.94 | 2.24 | 2.38 | 2.68 | 2.83 | 16.25 |
| 6 | F | 2.28 | 2.12 | 2.12 | 2.77 | 2.61 | 2.93 | 3.10 | 17.97 |
| 8 | F | 1.53 | 1.68 | 2.14 | 2.30 | 2.45 | 2.60 | 2.75 | 15.55 |
| 10 | F | 2.00 | 2.43 | 2.72 | 2.72 | 2.57 | 2.86 | 2.86 | 18.16 |
| 1 | S | 1.42 | 1.81 | 2.06 | 2.06 | 2.45 | 2.19 | 2.06 | 14.05 |
| 3 | S | 2.32 | 2.07 | 2.07 | 2.07 | 2.32 | 2.44 | 2.32 | 15.61 |
| 5 | S | 1.54 | 1.87 | 1.65 | 1.87 | 2.09 | 2.09 | 2.20 | 13.31 |
| 7 | S | 1.14 | 1.65 | 1.14 | 1.78 | 2.03 | 2.16 | 1.91 | 11.81 |
| 9 | S | 1.61 | 1.98 | 1.86 | 2.23 | 2.23 | 2.11 | 2.23 | 14.25 |

---

* See Appendix A, Table 5 for raw scores.

## Table 7

## Comparison of Fast-Slow Corrected Retest Means of 14 Subjects

| Subjects | Fast Retest | Slow Retest | |
|---|---|---|---|
| 1 | 1.512 | 1.366 | + |
| 2 | 1.512 | 1.824 | − |
| 3 | 2.074 | 1.958 | + |
| 4 | 2.132 | 2.006 | + |
| 5 | 2.432 | 2.178 | + |
| 6 | 2.240 | 2.034 | + |
| 7 | 2.490 | 2.010 | + |
| 8 | 2.088 | 1.606 | + |
| 9 | 2.104 | 1.876 | + |
| 10 | 2.358 | 1.756 | + |
| 11 | 2.580 | 2.002 | + |
| 12 | 2.576 | 2.224 | + |
| 13 | 2.890 | 2.038 | + |
| 14 | 2.916 | 2.144 | + |

Sign test--1 minus (slow $>$ fast) 13 +

$p = .002$ two tailed 1 −

## Table 8

### Comparison of Fast-Slow Corrected Retest Means of Ten Stories

| Stories | Fast Retest | Slow Retest | |
|---|---|---|---|
| 1 | 2.072 | 2.007 | + |
| 2 | 2.824 | 2.097 | + |
| 3 | 1.945 | 2.230 | − |
| 4 | 2.321 | 1.847 | + |
| 5 | 2.250 | 1.901 | + |
| 6 | 2.567 | 1.934 | + |
| 7 | 1.852 | 1.687 | + |
| 8 | 2.221 | 1.657 | + |
| 9 | 2.250 | 2.035 | + |
| 10 | 2.594 | 2.157 | + |

Sign test--1 minus (slow>fast) 9 +

.02 two tailed 1 −

## Table 9

## Rank Order of WPM Rates of Fast-Slow Versions of Ten Stories

| Fast | | | | Slow | | | |
|---|---|---|---|---|---|---|---|
| Stories | | | | Stories | | | |
| Book No. | Series No. | WPM rate Fast | Rank | Book No. | Series No. | WPM rate Slow | Rank |
| 9 | 10 | 193.80 | 1 | 9 | 10 | 160.20 | 1 |
| 11 | 3 | 199.80 | 2 | 16 | 9 | 165.60 | 2 |
| 12 | 5 | 201.60 | 3 | 11 | 3 | 167.40 | 3 |
| 16 | 9 | 202.20 | 4 | 15 | 7 | 170.40 | 4 |
| 13 | 4 | 208.20 | 5 | 14 | 8 | 172.20 | 5 |
| 1 | 1 | 214.20 | 6 | 13 | 4 | 172.80 | 6 |
| 15 | 7 | 216.00 | 7 | 12 | 5 | 175.20 | 7 |
| 14 | 8 | 216.60 | 8 | 1 | 1 | 175.20 | 8 |
| 17 | 6 | 219.00 | 9 | 17 | 6 | 183.40 | 9 |
| 3 | 2 | 232.20 | 10 | 3 | 2 | 187.02 | 10 |

# Appendix B

## Table 1

### Opinions of Subjects Toward the Story Content*

| Story | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | I,II | | II,I | | I,II | | II,I | | I,II | | II,I | | I,II | | II,I | | I,II | | II,I | | Total | | |
| WPM Rate | F | S | F | S | F | S | F | S | F | S | F | S | F | S | F | S | F | S | F | S | F | S | All |
| As well as other stories | 2 | 2 | 5 | 6 | 2 | 2 | 4 | 3 | 5 | 3 | 3 | 3 | 5 | 3 | 4 | 4 | 4 | 3 | 5 | 5 | 39 | 34 | 73 |
| Better than other stories | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 2 | 2 | 0 | 4 | 2 | 0 | 2 | 3 | 2 | 2 | 14 | 18 | 32 |
| Not as well as other stories | 1 | 3 | 1 | 1 | 5 | 5 | 3 | 3 | 1 | 0 | 2 | 2 | 2 | 0 | 1 | 3 | 1 | 1 | 0 | 0 | 17 | 18 | 35 |

---

* This is a summary of the responses to Question 21.

Question 21--How did you like this story:

A. As well as the other short stories you have read,

B. Better than the ones you have read,

C. Not as well as the ones you have read before.

## Table 2

## Sign Test on the Responses to Question 21 with Ten Fast-Slow Stories

| Stories | Fast wpm | Slow wpm | Sign |
|---|---|---|---|
| 1 | 17 | 13 | + |
| 2 | 14 | 13 | + |
| 3 | 9 | 9 | 0 |
| 4 | 11 | 12 | − |
| 5 | 14 | 16 | − |
| 6 | 14 | 15 | − |
| 7 | 12 | 18 | − |
| 8 | 15 | 11 | + |
| 9 | 15 | 16 | − |
| 10 | 16 | 16 | 0 |

three pluses, five minuses,
two zeroes

### Table 3

### Sign Test on the Responses to Question 21 of 14 Subjects on Fast-Slow Stories

| Subjects | Fast wpm | Slow wpm | Sign |
|---|---|---|---|
| 1 | 11 | 10 | + |
| 2 | 11 | 10 | + |
| 3 | 8 | 8 | 0 |
| 4 | 9 | 12 | − |
| 5 | 10 | 10 | 0 |
| 6 | 9 | 7 | + |
| 7 | 9 | 7 | 0 |
| 8 | 9 | 12 | − |
| 9 | 9 | 9 | 0 |
| 10 | 8 | 10 | − |
| 11 | 14 | 12 | + |
| 12 | 10 | 12 | − |
| 13 | 9 | 10 | − |
| 14 | 11 | 7 | + |

five pluses, four zeroes,
five minuses

Table 4

Subjects' Perceptions of WPM Rates of Stories They Heard*

| Story | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | I,II | | II,I | | I,II | | II,I | | I,II | | II,I | | I,II | | II,I | | I,II | | II,I | | Total | | |
| WPM Rate | F | S | F | S | F | S | F | S | F | S | F | S | F | S | F | S | F | S | F | S | F | S | All |
| Satisfactory | 3 | 7 | 4 | 6 | 3 | 5 | 6 | 6 | 2 | 5 | 7 | 7 | 3 | 6 | 6 | 7 | 6 | 7 | 7 | 7 | 47 | 63 | 110 |
| Could be Faster | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 5 |
| Could be Slower | 4 | 0 | 3 | 1 | 3 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 4 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 21 | 4 | 25 |

---

*Answers to Question 22

Question 22--The way the story was read:

A. It was satisfactory,

B. It should be read slower,

C. It should be read faster.

## Table 5

### Sign Test on the Responses to Question 22 with ten Fast-Slow Stories

| Subjects | Fast wpm | Slow wpm | Sign |
|---|---|---|---|
| 1 | 6 | 10 | − |
| 2 | 8 | 10 | − |
| 3 | 7 | 10 | − |
| 4 | 6 | 9 | − |
| 5 | 7 | 9 | − |
| 6 | 9 | 10 | − |
| 7 | 9 | 10 | − |
| 8 | 8 | 10 | − |
| 9 | 9 | 9 | 0 |
| 10 | 10 | 10 | 0 |
| 11 | 8 | 11 | − |
| 12 | 10 | 11 | − |
| 13 | 10 | 10 | 0 |
| 14 | 10 | 10 | 0 |

ten minuses, four zeroes

### Table 6

### Sign Test on the Responses to Question 22 with Ten Fast-Slow Stories

| Stories | Fast wpm | Slow wpm | Sign |
|---|---|---|---|
| 1 | 10 | 14 | + |
| 2 | 11 | 13 | + |
| 3 | 11 | 14 | + |
| 44 | 13 | 13 | 0 |
| 5 | 11 | 16 | + |
| 6 | 14 | 14 | 0 |
| 7 | 9 | 13 | + |
| 8 | 13 | 14 | + |
| 9 | 13 | 14 | + |
| 10 | 14 | 14 | 0 |

seven pluses, three minuses

## Appendix C

## Introductory Instructions

Directions given to the total group before starting the experiment:

The experiment you agreed to take part in is being done for the purpose of finding out whether "Talking Books" can be improved in any way. As a result of the work you will do, it is quite possible that many blind people who are using talking books for pleasure and learning may benefit. Also, the information collected will be used for a doctoral thesis by the experimenter who is himself blind.

The experiments will last two weeks, including two Saturdays. Everyday most of you will listen to a story and answer some questions about it. Some of you will answer the questions without listening to the stories. Everyday we will work together for about an hour from four to five p.m., except for the first Sunday and the two Saturdays; on those days the sessions will last 25 minutes each.

The make the experiment a success the following points should be kept in mind:

1. Every one should report five minutes before four p.m. to the room to which he was assigned. Please be punctual and do not keep the others waiting.

2. For the duration of the experiment you must not discuss the stories and the related questions among yourselves; if you are asked questions about what you are doing, you merely say that you are listening to some stories and answering questions about them.

3. For participating in this experiment, each of you will be paid 50 cents a day. The money will be given to you at the end of two weeks and only to those who have attended regularly. This is

necessary since if anyone misses one day he or she can not be included in the experiment at all. So it is essential to take part in the experiment every day until the end, if you wish to earn the money.

Directions I--given prior to the beginning of the story.

"Please listen to the story I will tell you. When it is finished I will ask you to answer 20 questions about it. The title of the story is .............. by ............."

Directions II--given only in relation to the fast and slow versions of the first story, at the end of the story and prior to the regular test directions.

"There are two points which you should keep in mind in taking these tests. First, we will repeat every question twice. For example:

'The president of the United States is:

A. George Washington,

B. Abraham Lincoln,

C. Elvis Presley,

D. Dwight Eisenhower,

E. Harry S. Truman.'"

(After a one second interval the question and the five choices were repeated a second time.)

"The second point is that we want you to wait until you hear all five choices of the second repetition before you record your answer. I repeat, we want you to wait until you hear all of the five choices of the second repetition before you record your answers."

Directions III--given after each story.

"Now you will be asked to answer 20 questions about the story which was read to you. You are to listen carefully to the questions,

then to the five choices. After a brief pause, the questions will be repeated along with the choices. Each question is numbered and each of the choices is lettered. The first choice is A, the second B, the third C, fourth D, and the fifth is E. You have to write the question number, then the letter that identifies the correct choice. Remember, write every question number when you hear it the first time, then after it, write the letter of the correct choice. If you are not sure of the correct choice, guess. These questions are about ....... (the title of the story is inserted), by ....... (the name of the author)."

## Appendix D

Some specifications for recording Talking Book records prepared by the Library of Congress, Reference Department, Division for the Blind and agencies under their control:

"40--The following requirements which are not susceptible of physical measurement must be fulfilled to the satisfaction of this Project.

"Reader diction: 41--The reader's voice, when recorded, and when reproduced on a Talking Book machine, shall be (a) clear and distinct; each English word with its context shall be readily understandable, (b) pleasing, (c) flexible--capable of rendering without awkwardness the tonal changes involved in giving proper emphasis and characterization, and (d) free from objectionable disturbances such as coughs, serious or frequent hesitation, and the like.

"Reader interpreation: 42--The reading shall be (a) appropriate to the book, (b) sympathetic but not exaggerated, (c) restrained but not stilted or mechanical, (d) attentive to the sense of the book and skillful in securing proper emphasis.

"Accuracy: 43--The talking book edition of any book shall conform as closely as practicable to the ink-print edition and, to secure this end, each recording must be carefully proof-read.

"44--Such works as the Bible, historical documents, and familiar poems shall be word perfect.

"45--No record, whether recorded on one or on both sides shall be acceptable which contains (a) more than one mispronounciation, (b) a misreading which changes the original meaning of the text, or (c) which fails in other respects to follow satisfactorily the text

of the ink-print edition.

"46--Foreign words and phrases shall be recorded with extreme accuracy, and translated when their meaning is important to a clear understanding of the text.

"Standard of pronounciation: 47--It will be expected that pronounciation represent the accepted usage. In specific instances if authority for a pronounciation can be cited in the current edition of Webster's New International Dictionary, Funk and Wagnalls New Standard Dictionary, or the Shorter Oxford Dictionary, such pronounciation will be acceptable provided it is appropriate to the style of the book.

"Speed: 48--When reproduced on a Talking Book machine at the standard turntable speed the reading shall be delivered at a speed which (a) gives an impression neither of racing nor of dragging, (b) is sufficiently deliberate so as not to strain the attention of the listener when the meaning of the passage is otherwise clear, (c) permits full attention to be given to the meaning of the text, change of interlocutor, etc.

"Plays recorded by casts: 49--.....................

"Announcements: 50--.................."

# Vita

Mitat Ahmet Enc was born on December 24, 1909, in Gaziantep, Turkey. He lost his sight at the age of 21 while attending the Law School of Istanbul University. While under treatment in Vienna, Austria, he developed an interest in the education of handicapped children and began his studies at the Vienna Pedagogical Institute. After two years of study and practical experience in the field in that country, he was offered a scholarship from Perkins School for the Blind, Watertown, Mass., to come to the U. S. and take the Harvard Course on the Education of the Blind. In 1937, he received a scholarship from the New York Institute for the Education of the Blind to get teaching experience and attend the Teachers College, Columbia University. He received his B.S in 1938 and M.A in 1939 from Teachers College and in the same year returned to his native country.

In 1940 he was given a teaching position at Gazi Teachers College Ankara, Turkey, to introduce and teach courses on the education of exceptional children. In 1951 he was assigned by the Ministry of Education to organize a school for the blind in Ankara which he did and acted as its superintendent until 1956 while continuing his teaching at the College. In 1953 he was asked by the Ministry to organize a Special Education Department at Gazi Teachers College to train teachers for the newly developing field. Until 1956 he acted as the head of the new department. In 1956 he came to the U. S. through a Ford Foundation fellowship to complete the requirements for a PhD degree.

He served in several advisory committees to the Ministry of Education, is a member of the UNESCO National Committee, and the

Executive Board of World Council for the Welfare of the Blind.

He has written the following books which are published by the Ministery of Education, Publications Department:

1. The Education of the Blind (1946).
2. Mental Hygiene (1948).
3. Educational Psychology (co-author) (1951).

He has translated the following works into Turkish:

1. Three Contributions to the Theory of Sex, Sigmund Freud (1943).
2. Education in the U.S. (Office of Education publication) (1945).
3. The Adolescent Psychology, Kanklin (1949).
4. Education of Slow Learning Child, C. Ingram (1956).
5. Microbe Hunters, P. deKruiff,(1950).

He has also contributed to the professional journals of his country.

HV1736
E12 c.1

Enc, Mitat Ahmet.
THE EFFECT OF TWO DIFFERENT
WPM LISTENING RATES ON
LEARNING...... (1958)

| | DATE DUE | |
|---|---|---|

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HV1736
E12 c.1

Enc, Mitat Ahmet.

THE EFFECT OF TWO DIFFERENT WPM LISTENING RATES ON LEARNING AND RETENTION OF BLIND SCHOOL CHILDREN (1958)

| DATE | ISSUED TO |
|---|---|
| | REFERENCE |
| | |
| | |

AMERICAN FOUNDATION FOR THE BLIND
15 WEST 16th STREET
NEW YORK, N.Y. 10011